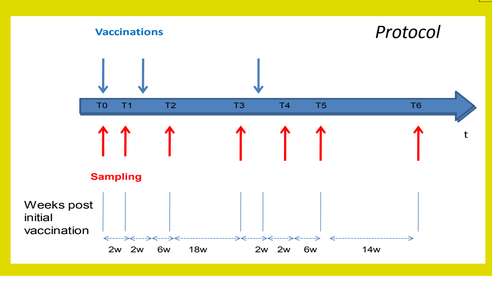
FMD vaccination trial and viral circulation at the wildlife-livestock interface in the South-East Lowveld (SEL) of Zimbabwe

Introduction & Methods:

In African ecosystem, Foot-and-Mouth Disease (FMD) is believed to be maintained in wildlife, African buffalo (*Syncerus caffer*) being the main reservoir and acting as a source of infection of domestic speices. In TransFrontier Conservation Areas (TFCAs), which include protected areas and community lands under various conservation and land use, the interface between wildlife and livestock is considered to be a hot spot of FMD transmission. Vaccination of community cattle at this interface is one option commonly used by veterinary services to control FMD spread in adjacent areas.

We designed a vaccination protocol of cattle from 2 diptanks in the Sengwe Communal Land at the periphery of Gonarezhou National Park (GNP) in a high and a low contact risk with wildlife and with 2 additional diptanks used as controls in each risk area (120 animals per diptank at the beginning of the protocol; average of 63 animals per diptank at T6). We investigated the following questions:

- To monitor the serological responses in vaccinated and control animals
- To determine the proportion of animals that seroconvert and was possibly infected
- To determine the duration of antibody responses induced by single dose of FMD vaccine



Low Risk Area

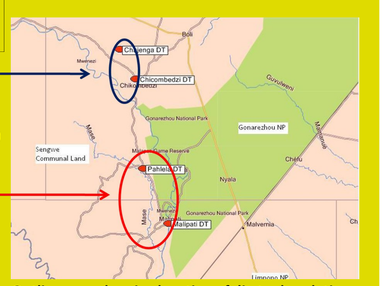
Pfumare

Chompane (Vacc.)

High Risk Area

Pahlela

Malipati (Vacc.)



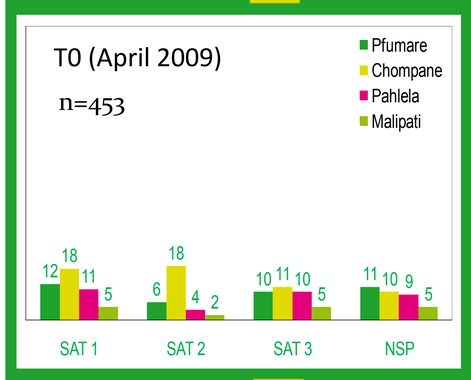
Outline map showing location of dip tanks relative to GNP

Preliminary Results (T0, T1, T2, T3, T4)

Tests used:

- Liquid phase blosking ELISA (LPBE) for the 3 SAT types on each sample
- All samples collected at T0 and T3 were tested for antibodies to the Non Structural Protien (NSP)

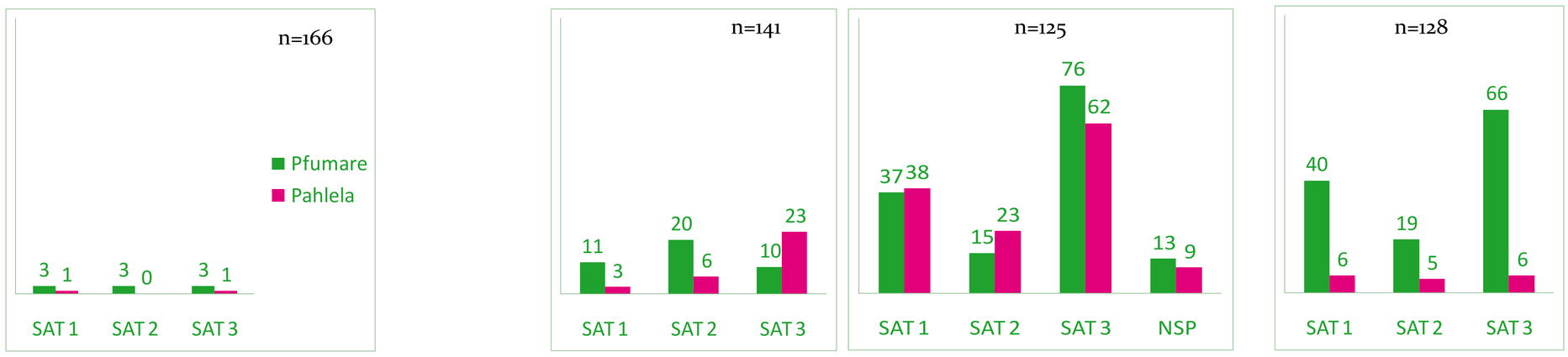
Removal of positive animal after T0



Removal of positive animal after T0

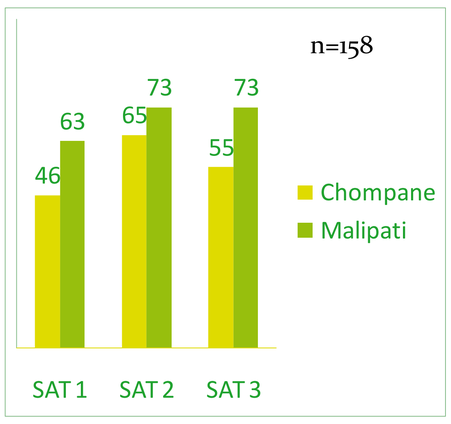
All results are displayed as percentage

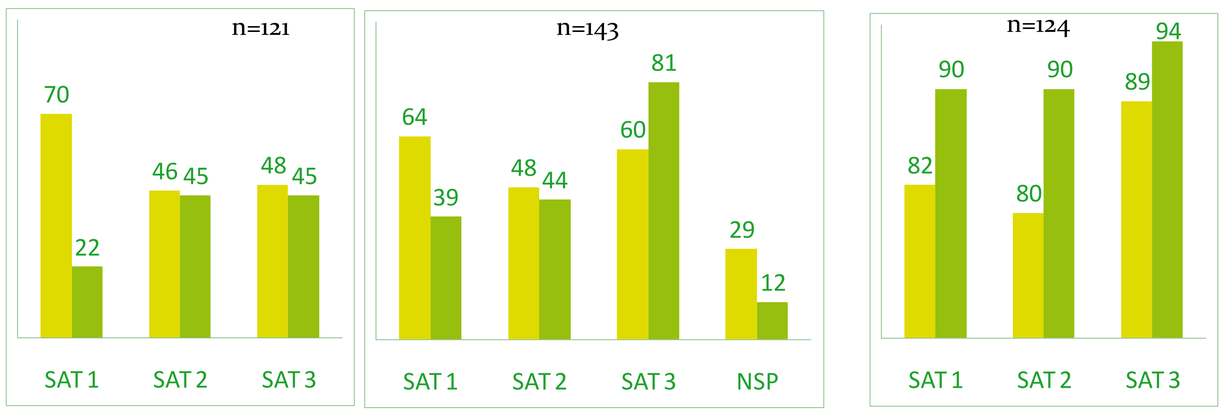
Non-vaccinated dip tanks



T1 (+15d) T2 (+122d) T3 (+156d) T4 (+210d)

V (T0) V (+28d) V (+181d)





Vaccinated dip tanks

Discussion:

- The T0 vaccination was done simultaneously with the district vaccination against FMD using the same regionally produced vaccine; the following re-vaccination were done only for the herds included in the protocol (no vaccine was available for the veterinary services to implement the second vaccination);
- At T0 , **there is a baseline viral seropositivity of 10%** (NSP test indicates viral circulation);

- **Unvaccinated diptanks**: from T2 (July 2009), there is antibody detection indicating virus circulation; this antibody level increase at T3 (August 2009) and 11% of NSP positivity were detected confirming viral circulation; at T4 in Pfumare, a decrease of serological response is observed (see figures); T4 results in Pahlela are inconsistent with previous results but are still unexplained;
- **Vaccinated diptanks**: at T1, there is a good antibody (vaccinal) response; between T2 and T3 there is an increase in antibody response despite the fact that no re-vaccination occured; NSP test results at T3 averaging 20% between the 2 dip tanks indicate virus circulation despite vaccination; at T4 after the re-vaccination, the antibody response is very high (above 85% on average);

- The antibody response in vaccinated and unvaccinated diptank indicate that an **outbreak of FMD occured during the study period**, most probably caused by a **SAT3 virus**. No clinical signs have been detected on animals during the course of the study (which is not expected for FMD outbreaks);
- **The vaccination protocol did not prevent cattle from becoming infected and developping antibodies against FMD.** The reason for this failure are still under investigation but one possible explanation is the inadequacy between the viral strains used for the vaccine (no viral strain has been isolated from the SEL for 10 years) and the current circulating strains in the field;

- Finally, as it seems that there has been virus circulation in 2008 and in 2009 and that virus circulation in 2009 picked in August (which is in agreement with the seasonality of outbreaks in the SEL), we recommand that **virus isolation should be attempted during the same season (August-October preferably) on cattle and on buffalo** in order to produce local strains to be used for vaccine production.

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